

## U.S. DISTRIBUTION OF THE COEUR D'ALENE SALAMANDER (*PLETHODON IDAHOENSIS* SLATER AND SLIPP)

Albert G. Wilson, Jr.<sup>1</sup>, Evelyn M. Wilson<sup>2</sup>, Craig R. Groves<sup>3</sup>, and Richard L. Wallace<sup>4</sup>

*Key words:* Amphibia, salamander, *Plethodon*, geographic distribution, Rocky Mountains.

The Coeur d'Alene salamander (*Plethodon idahoensis*) is the only lungless salamander (Plethodontidae) known from the northern Rocky Mountains. Discovered in 1939 on the Idaho Panhandle (Slater and Slipp 1940), this terrestrial amphibian has since been encountered in northwestern Montana and southeastern British Columbia (Teberg 1964, Holmberg et al. 1984).

Prior to this study, the status and exact locations of some historic *P. idahoensis* collection sites were unknown (Groves 1988). Moreover, the northern Rocky Mountains in the U.S. had not been well surveyed for amphibians (Nussbaum et al. 1983), raising the possibility that additional localities might exist. To assist conservation efforts directed toward this species (Groves 1988), we conducted surveys documenting its occurrence south of Canada. Herein we report results of the study.

We compiled locality data from reviews in Brodie (1970), Brodie and Storm (1970), and Lynch (1984); from unpublished records of Idaho and Montana wildlife agencies; from personal correspondence with individuals having field experience with *P. idahoensis*; and from the collection records of the following museums: California Academy of Sciences, San Francisco (CAS); Museum of Vertebrate Zoology, University of California, Berkeley; American Museum of Natural History, New York; Field Museum of Natural History, Chicago; Museum of Comparative Vertebrate Zoology, Harvard University, Cambridge.

Fieldwork was conducted from 1987 through 1994, primarily during wet weather in spring

and fall. Working within and around the geographic range of *P. idahoensis* as it was known previously (Lynch 1984), we surveyed regions accessible by road or trail in Idaho and Montana up to 2000 m elevation and attempted to visit and verify all previously reported localities. We located salamanders by digging, by displacing surface objects, and by night searches with flashlight. Descriptions of localities are listed with the Idaho Natural Heritage Program, Boise, and the Montana Natural Heritage Program, Helena. Voucher specimens have been deposited in CAS, in the Charles R. Conner Museum (CM), Washington State University, Pullman, and in herpetological collections at the University of Idaho (UI).

A locality is here defined as an area of occurrence >0.5 km from another such area. It appears that at least 55 localities were recorded for *P. idahoensis* before the present study. We found vague and incomplete data for some historic collection sites and suspect they may be synonymous with localities for which we have more complete information. The Canadian extent of this species has yet to be completely documented. Three British Columbia localities exist in the Kootenai Valley within 60 km of the U.S.-Canadian border (Orchard 1991).

One hundred thirty-two new localities were discovered during our field surveys. These include the following 3 range extensions: 39 km due NNE of Libby, Lincoln County, Montana, on 9 May 1988 (CM 89-161; 48°44'23"N, 115°19'15"W; 792 m elev.); 6.5 km due W of Victor, Ravalli County, Montana, on 25 May

<sup>1</sup>Department of Zoology, Washington State University, Pullman, WA 99164-4236. Present address: Department of Life Sciences, Spokane Falls Community College, MS 3180, 3410 West Fort Wright Drive, Spokane, WA 99224-5288. Address correspondence to this author.

<sup>2</sup>College of Veterinary Medicine, Washington State University, Pullman, WA 99164-7010. Present address: Peone Pines Veterinary Clinic, 4717 North Newport Highway, Mead, WA 99021.

<sup>3</sup>Idaho Department of Fish and Game, 600 South Walnut Street, Box 25, Boise, ID 83707. Present address: The Nature Conservancy, 2060 Broadway Avenue, Suite 230, Boulder, CO 80302.

<sup>4</sup>Department of Biological Sciences, University of Idaho, Moscow, ID 83843.

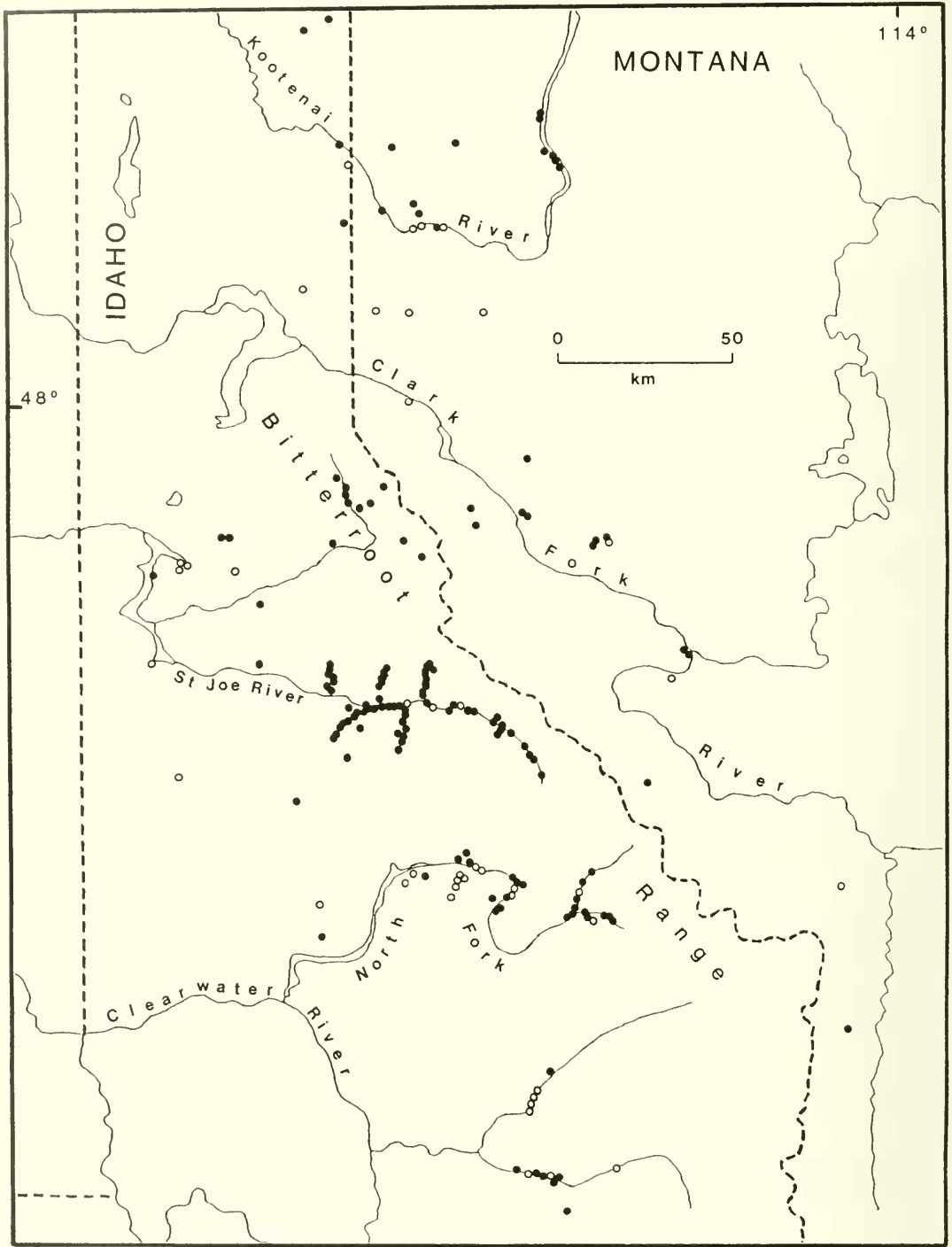


Fig. 1. U.S. distribution of the Coeur d'Alene salamander (*Plethodon idahoensis*). Historic localities are represented by open circles, new localities by closed circles.

1987 (CM 89-163; 46°25'29"N, 114°15'23"W; 1550 m elev.); and 32 km due SE of Lowell, Idaho County, Idaho, on 15 May 1989 (UI IA 627-1; 46°04'35"N, 115°16'16"W; 780 m elev.). In all, these sites extend the species' known range 44 km NE, 87 km E, and 16 km S, respectively (Teberg 1965, Brodie 1970, Lynch 1984).

We found *P. idahoensis* in forested, mountainous regions between 500 and 1550 m elevation. Most localities occur in valleys draining the west slope of the Bitterroot Range of Idaho; the southernmost occur in the Clearwater River drainage (Fig. 1). The species has a scattered distribution in the Clark Fork and Kootenai River drainages of Montana. We commonly encountered the salamander in talus and other rocky debris. Exposures of fractured bedrock are present at almost all localities, and we often observed *P. idahoensis* using fractures as retreats. All localities are affiliated with springs, seepages, or damp areas along streams.

Except for the existence of some marginal lowland populations in xerophytic habitats, distribution of *P. idahoensis* is confined to temperate mesophytic forest types (Daubenmire 1978). The upper altitudinal limits of the salamander coincide with the transition between temperate mesophytic and subalpine communities in the northern Rockies (Arno 1979, Habeck 1987), and exceed those of most western plethodons (Nussbaum et al. 1983).

*Plethodon idahoensis* is part of a disjunct coastal biota inhabiting the portion of the Rocky Mountains in which maritime climatic influence is strongest (Arno 1979, Johnson 1987, Cooper et al. 1991). Annual precipitation in regions occupied by *P. idahoensis* averages 50–140 cm; the highest levels occur on the west slope of the Bitterroots where the salamander is most abundant (Pacific Northwest River Basins Commission 1969). Through much of its range *P. idahoensis* occupies drier terrain than do other western plethodons at the same latitudes (Dumas 1956, Herrington 1985, Wilson et al. 1995). This species' affinity for stream margins and seepages contributes to its survival in comparatively arid habitats (Wilson and Larsen 1987).

Much precipitation in the northern Rocky Mountains occurs as snow (Finklin 1983), and regions inhabited by *P. idahoensis* have colder, more prolonged winters than those inhabited by most of the salamander's western congeners (Nussbaum et al. 1983). Freezing weather affects

distributions of salamanders by limiting time for foraging and reproduction (Lynch 1981). Not surprisingly, *P. idahoensis* occupies drainages with the longest local annual frost-free periods. The Kootenai Valley, which contains the species' northernmost populations, has the longest frost-free season of any forested region in northwestern Montana or southeastern British Columbia (Caprio 1965, Ross and Savage 1967, Farley 1979).

The association of *P. idahoensis* with rocky microhabitat is consistent with reports of other terrestrial salamanders. Talus and rock outcrops favor occurrence of these forms by providing seasonal shelter and oviposition sites (Herrington and Larsen 1985, Ramotnik and Scott 1988, Bury et al. 1991). Such retreats have historically insulated *P. idahoensis* from the harsh climate and recurrent wildfires of the northern Rockies (Arno 1980, Nussbaum et al. 1983). As has been proposed for other plethodons (Herrington 1988), we suggest that protection of underground refugia may be the key to preserving populations of this species in the future.

#### ACKNOWLEDGMENTS

This study was supported by the USDA Forest Service, Bureau of Land Management, and Natural Heritage Programs of Idaho and Montana. We thank the cited museums, Joel Chavez, Lowell Diller, Phillip Dumas, James Lynch, Ronald Nussbaum, Stanley Orchard, and Kenneth Teberg for sharing locality data. Other assistance was provided by Daniel Bivens, Francis Cassirer, Patrick Mullen, Nancy Tyler, and Richard Wallen. Manuscript reviewers included Keith Aubry, Robert Herrington, Lawrence Jones, and John Larsen.

#### LITERATURE CITED

- ARNO, S.F. 1979. Forest regions of Montana. USDA Forest Service Research Paper INT-218. Intermountain Forest and Range Experiment Station, Ogden, UT. 39 pp.
- . 1980. Forest fire history of the Rocky Mountains. *Journal of Forestry* 78:460–465.
- BRODIE, E.D., JR. 1970. Western salamanders of the genus *Plethodon*: systematics and geographic variation. *Herpetologica* 26:468–516.
- BRODIE, E.D., AND R.M. STORM. 1970. *Plethodon vandykei*. American Society of Ichthyologists and Herpetologists Catalog of American Amphibians and Reptiles: 91.1–91.2.
- BURY, R.B., P.S. CORN, AND K.B. AUBRY. 1991. Regional patterns of terrestrial amphibian communities in Oregon

- and Washington. Pages 341–350 in L.F. Ruggiero, K.B. Aubry, A.B. Carey, and M.H. Huff, editors. Wildlife and vegetation of unmanaged Douglas-fir forests. USDA Forest Service General Technical Report PNW-GTR-285. Pacific Northwest Research Station, Portland, OR.
- CAPRIO, J.M. 1965. Average length of freeze-free season. Folder 83. Montana Agricultural Experimental Station, Bozeman.
- COOPER, S.V., K.E. NEIMAN, AND D.W. ROBERTS. 1991. Forest habitat types of northern Idaho: a second approximation. USDA Forest Service General Technical Report INT-236. Intermountain Forest and Range Experiment Station, Ogden, UT. 143 pp.
- DAUBENMIRE, R. 1978. Plant geography. Academic Press, New York. 338 pp.
- DUMAS, P.C. 1956. The ecological relations of sympatry in *Plethodon dunni* and *Plethodon vehiculum*. Ecology 37:484–495.
- FARLEY, A.L. 1979. Atlas of British Columbia. University of British Columbia Press, Vancouver. 136 pp.
- FINKLIN, A.I. 1983. Weather and climate of the Selway-Bitterroot Wilderness. University Press of Idaho, Moscow. 144 pp.
- GROVES, C.R. 1988. Status and distribution of the Coeur d'Alene salamander (*Plethodon vandykei idahoensis*) in Idaho. Unpublished report to the Idaho Department of Fish and Game, Boise. 39 pp.
- HABECK, J.R. 1987. Present-day vegetation in the northern Rocky Mountains. Annals of the Missouri Botanical Garden 74:804–840.
- HERRINGTON, R.E. 1985. The ecology, reproductive biology, and management of the Larch Mountain salamander (*Plethodon larselli* Burns) with comparisons to two other sympatric plethodons. Unpublished doctoral dissertation, Washington State University, Pullman. 102 pp.
- . 1988. Talus use by amphibians and reptiles in the Pacific Northwest. Pages 216–221 in R.C. Szaro, K.E. Severson, and D.R. Patton, editors. Management of amphibians, reptiles, and small mammals in North America. proceedings of a symposium, Flagstaff, AZ. USDA Forest Service General Technical Report RM-166. Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO.
- HERRINGTON, R.E., AND J.H. LARSEN. 1985. Current status, habitat requirements and management of the Larch Mountain salamander *Plethodon larselli* Burns. Biological Conservation 34:169–179.
- HOLMBERG, R.G., N.P.D. ANGERILLI, AND L.J. LACASSE. 1984. Overwintering aggregations of *Leiobunum paessleri* in caves and mines (Arachnida: Opiliones). Journal of Arachnology 12:195–205.
- JOHNSON, P.J. 1987. Larval taxonomy, biology, and biogeography of the genera of North American Byrrhidae (Insecta: Coleoptera). Unpublished master's thesis, University of Idaho, Moscow. 268 pp.
- LYNCH, J.E., JR. 1984. Reproductive ecology of *Plethodon idahoensis*. Unpublished master's thesis, University of Idaho, Moscow. 59 pp.
- LYNCH, J.E. 1981. Patterns of ontogenetic and geographic variation in the black salamander, *Aneides flavipunctatus* (Caudata: Plethodontidae). Smithsonian Contributions to Zoology 324:1–53.
- NUSSBAUM, R.A., E.D. BRODIE, JR., AND R.M. STORM. 1983. Amphibians and reptiles of the Pacific Northwest. University Press of Idaho, Moscow. 332 pp.
- ORCHARD, S.A. 1991. Amphibian population declines in British Columbia. Pages 10–13 in C.A. Bishop and K.E. Pettit, editors. Declines in Canadian amphibian populations: designing a national monitoring strategy. Canadian Wildlife Service Occasional Paper 76. Canadian Wildlife Service, Ottawa, Ontario.
- PACIFIC NORTHWEST RIVER BASINS COMMISSION. 1969. Climatological handbook. Columbia Basin States precipitation. Volume 2. Environmental Science Services Administration, Washington, DC. 262 pp.
- RAMOTNIK, C.A., AND N.J. SCOTT, JR. 1988. Habitat requirements of New Mexico's endangered salamanders. Pages 54–63 in R.C. Szaro, K.E. Severson, and D.R. Patton, editors. Management of amphibians, reptiles, and small mammals in North America: proceedings of a symposium, Flagstaff, AZ. USDA Forest Service General Technical Report RM-166. Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO.
- ROSS, S.H., AND C.N. SAVAGE. 1967. Idaho earth science: geology, fossils, climate, water, and soils. Idaho Earth Science Series 1:1–271.
- SLATER, J.R., AND J.W. SLIPP. 1940. A new species of *Plethodon* from northern Idaho. Occasional Papers of the Department of Biology, College of Puget Sound 38:38–43.
- TEBERG, E.K. 1964. An extension into Montana of the known range of *Plethodon vandykei idahoensis*. Herpetologica 19:287.
- . 1965. Range extensions of the salamander *Plethodon vandykei idahoensis*. Copeia 1965:244.
- WILSON, A.G., JR., AND J.H. LARSEN, JR. 1987. Activity and diet in seepage-dwelling Coeur d'Alene salamanders (*Plethodon vandykei idahoensis*). Northwest Science 62:211–217.
- WILSON, A.G., JR., J.H. LARSEN, JR., AND K.R. McALLISTER. 1995. Distribution of Van Dyke's salamander (*Plethodon vandykei* Van Denburgh). American Midland Naturalist 134:388–393.

Received 8 January 1997

Accepted 16 June 1997